

Contracting with Government for low carbon technologies: Designing the Visible Hand

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Long-term contracting in electricity markets

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Outline

- What market failures need addressing?
- State aid guidance on correcting market failure
- Why are long-term contracts needed?
 - What form should they take?
 - How do different models compare?
- How should they be financed?

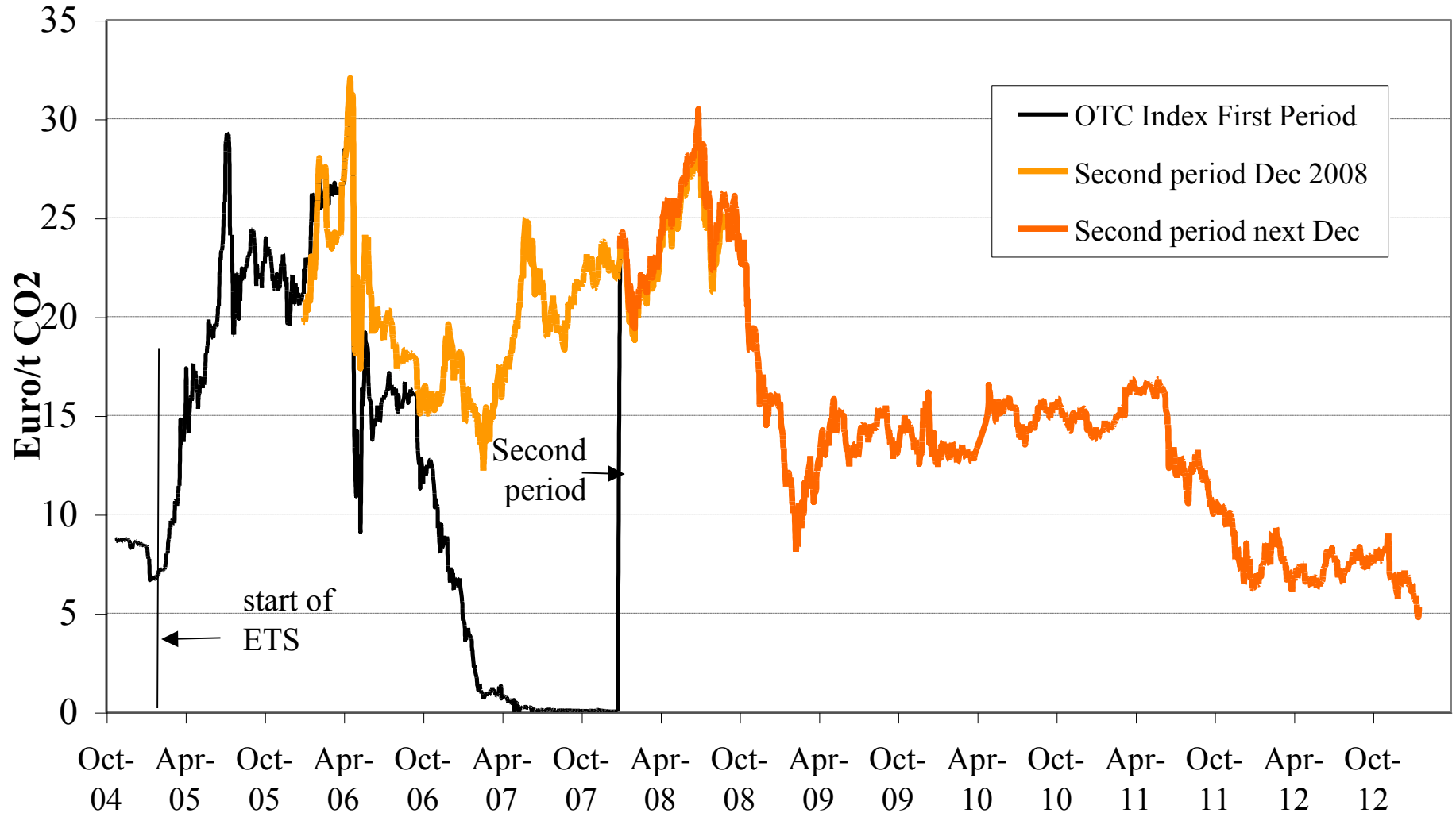


- **ETS** to price CO₂
 - to support **mature** low-C options
 - fixes quantity not price => poor guide for low-C
- **20-20-20 Renewables Directive:**
 - demand pull for **not-yet-commercial** renewables
 - justified by learning spillovers and burden sharing
- **EU Strategic Energy Technologies (SET) Plan**
to double 2007 R&D spend
 - R&D to support **less mature** low-C options



Carbon prices have crashed

EUA price October 2004-March 2013



Source: EEX

Failures of ETS

- Current ETS sets quota of total EU emissions
- 20-20-20 Renewables Directive increases RES
 - => increased RES does not reduce CO₂
 - => reduces carbon price
 - => prejudices other low-C generation like nuclear
- Risks undermining support for RES

Solution: fix carbon price instead of quota

Plan B: each country has carbon price floor



The case for a carbon tax

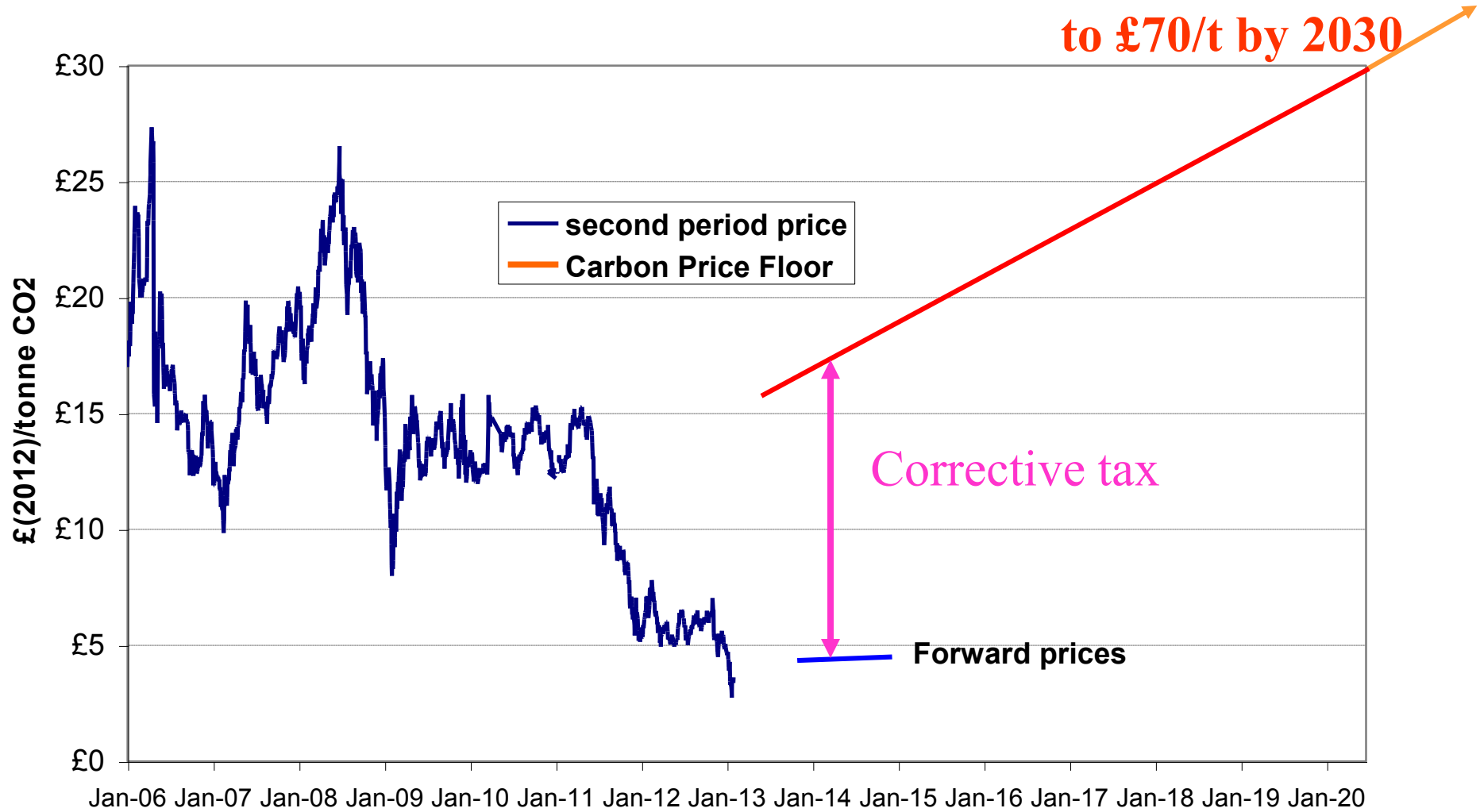
- Each country imposes a Carbon tax
 - tax bads not goods as part of fiscal adjustment
 - rebated by EUA price for covered sector
 - can start low: €20/t CO₂ and escalate at 5% p.a. above RPI = €34/t by 2020
- Tax can finance research and renewables

Message: setting a carbon tax is better than trading carbon permits



UK's Carbon Price Floor - in Budget of 3/11

EUA price second period and CPF £(2012)/tonne



- DG COMP's State aid guidelines designed to prevent market distortions
 - to be updated for energy 2014
- intervention justified by **irreparable market failures**
- Test of intervention: “is the aid measure proportional, namely could the same change in behaviour be obtained with less aid?”
- So what market failures justify **Government** contracts?
- and what form should they take?



- Carbon price too low; hard to reform ETS
 - ⇒ country-specific Carbon Price Floor
 - but that **distorts trade**
 - and is **not credibly durable** without contractual underwriting
- What about a Government **subsidy**?
 - **not credibly durable** without contractual underwriting
- RES not commercial even with adequate C price
 - ⇒ devise additional support for RES
 - ⇒ a premium FiT, a fixed price FiT or CfD?
 - ⇒ which is most efficient/least cost?



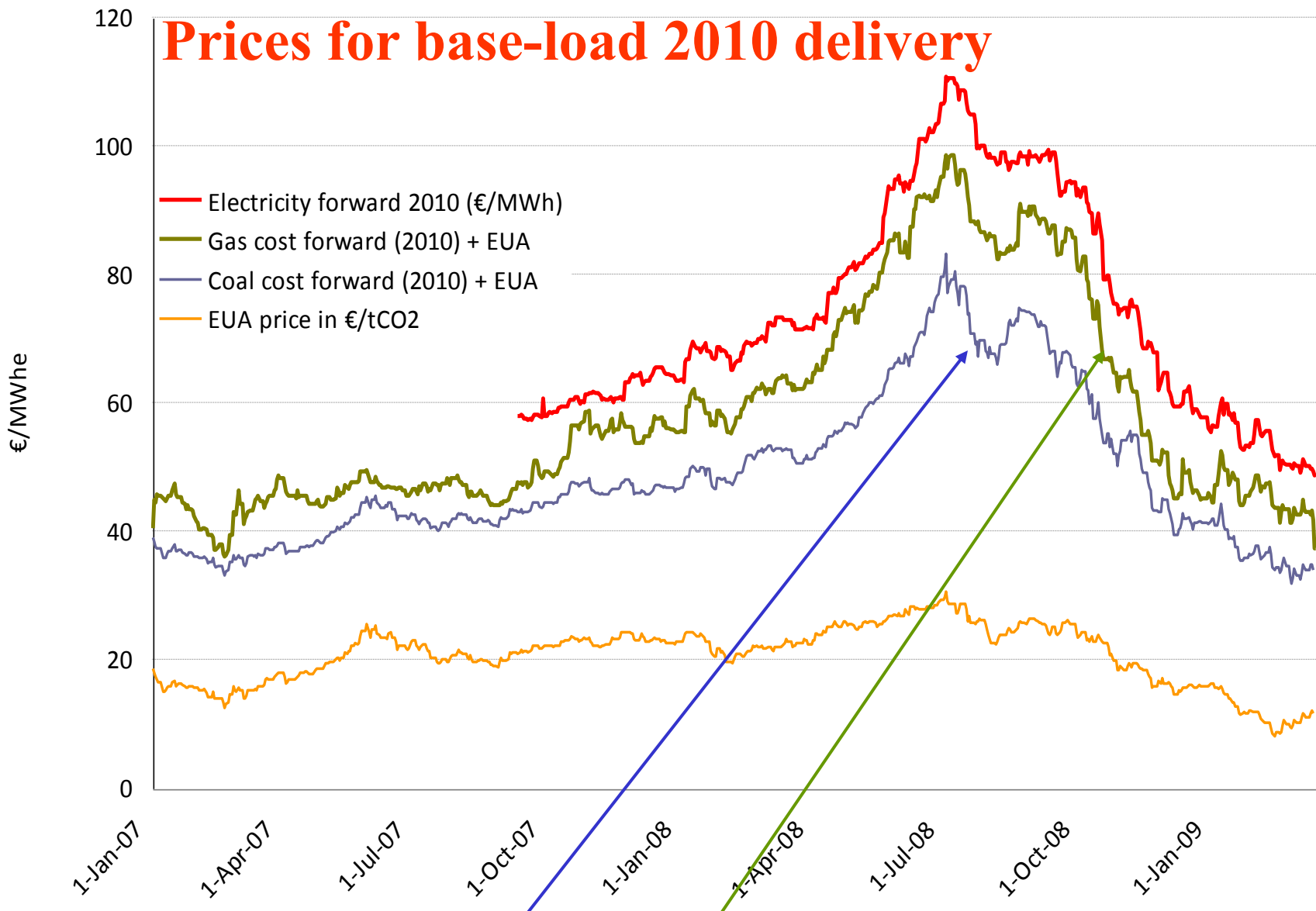
Long-term contracts

- CO₂ price unpredictable, CPF not credible
 - Electricity prices risky to non-fossil gen
- ⇒ long-term contract enforceable in courts
- but technologies differ and so should contracts
 - ⇒ simple FIT for on-shore wind
 - ⇒ tender auctions for wind?
 - ⇒ CfD for nuclear, subsidy to capital for demo CCS?

Need satisfactory counter-party = Government

Need to adapt contract to technology





Correlation of coal+EUA on gas+EUA high

Source: Bloomberg

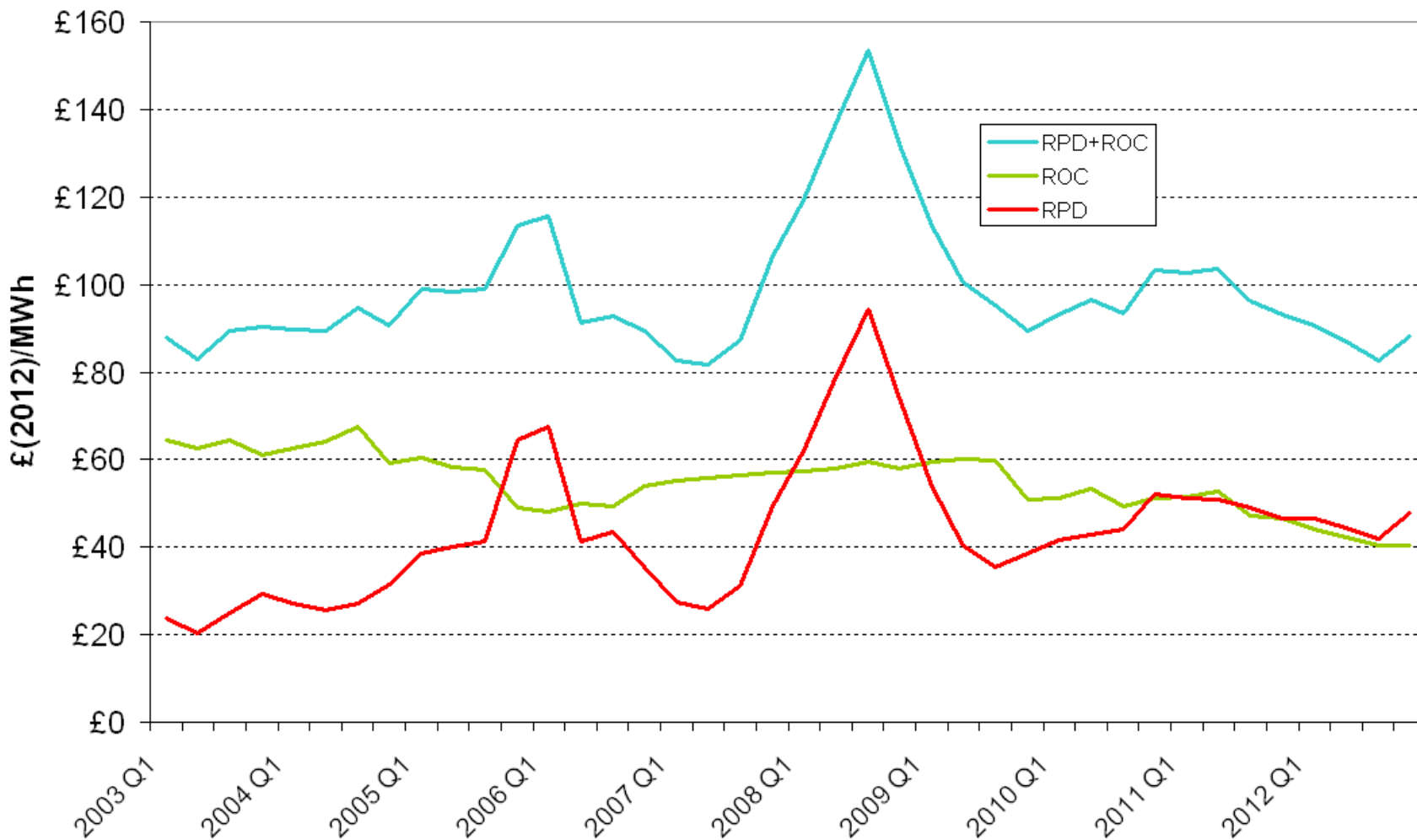
- Efficiency \Rightarrow least total system cost
 \Rightarrow including **costs** for transmission, balancing, inertia, etc
- least cost to consumers \Rightarrow avoid excessive rent
 - wind resource varies with location

Solution A - PFiT: efficiently price all **costs**, pay fixed premium per MWh, otherwise leave to market (UK)

- Problems: hard to locationally price extra T for wind
 - after location choice, wind & PV are largely **uncontrollable**
 - forecasting more efficient if aggregated
 - balancing markets often imperfect, costly for small firms
 - market risk **raises cost of capital, discourages entry**



Support to Wind under the ROC Scheme (real prices)



- Government announces strike prices and annual subsidy limit
 - uniform by technology (except Island wind), set 2014-17
 - runs **in parallel with ROCs (pFiTs) to 2017**
 - => has to be made as attractive as ROCs
 - => comparable rate of return (rather high for on-shore wind)
 - => **undermines logic of lowering cost by lowering risk**
 - => relies on locational grid signals (still under discussion)
- may lead to tender auctions if levy control breached
 - => **could then lead to better market-led outcome**



- Pay fixed price per MWh for n years (DE)
 - measure output for three years to estimate market revenue
 - n set to cover excess cost relative to market revenue
 - low in windy places extracts (share of) excess rent
 - requires good locational signals for transmission costs
 - SO responsible for dispatch, weather forecasting etc
- **Auction** for FiT to connect to specified grid points
 - TSO assess all extra costs (transmission balancing etc)
 - developers assess local RES resource, choose best site, specify price level, contract length, constrained off payment
 - SO select least cost to system; developer pays local connex



- CCS and wave/tidal stream at pre-deployment stage
 - arguably off-shore wind as well
- need demo plants to assess cost *and* more R&D
- What is the best form of support?
- Competition - as for CCS, with support for major risk
=> capital subsidy with large cost share
- arguably also appropriate for first nuclear plant
- Competition for R&D projects
 - need criteria to select and terminate



How should they be funded?

- Reducing carbon, creating learning and knowledge are all ***PUBLIC GOODS***
- => finance out of public funds, **not levies** on electricity
- current policies exempt some industries in some countries from such levies
 - legally discriminatory, violates State aids, DG COMP cross
- => Solution = ALL industry should be exempt from distortionary taxes => fall on final consumers (VAT)

Make Energy policy consistent with good public finance



Conclusions

- Long-term contracts needed as no credible futures markets for corrective carbon tax
- Near-market renewables needs extra support
 - long-term contracts hedge political risk
 - contract design needs improvement
 - auctioned contracts better if adequate competition
- Immature technologies need targeted competitively bid support
- Subsidies should come from general taxation



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Acronyms

CCS	Carbon capture and storage
CfD	Contract for Difference - pays (charges) difference between strike price and reference market price
CPF	carbon price floor
ETS	Emissions Trading System
EUA	EU Allowance for 1 tonne CO ₂
FiT	Feed-in tariff
pFiT	Premium FiT
RES	Renewable Electricity Supply
ROC	Renewable Obligation Certificate
SC	Scotland
SO	System Operator
T	Transmission
TSO	Transmission System Operator
TEM	Target Electricity Market